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James R. Gibbons
Iowa State University

Earl O. Heady
Iowa State University

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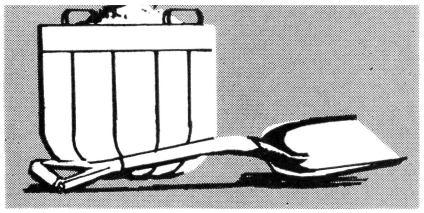
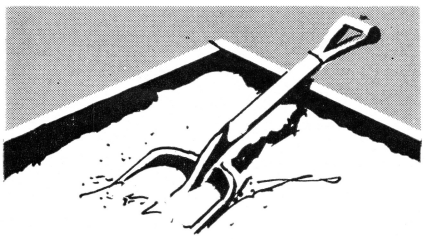
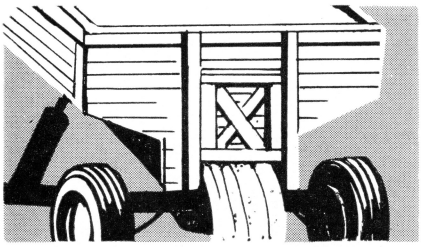
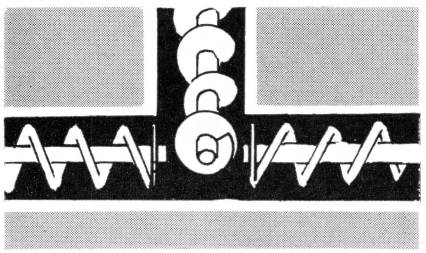








WHAT CATTLE-FEEDING METHOD FOR YOU ?

There's a trend toward more specialization and mechanization in cattle feeding. What method is best for you? Research at Iowa State suggests some guidelines to consider with your situation and size of operation.

by James R. Gibbons and Earl O. Heady

MANY CHANGES are taking place in cattle feeding. A development of considerable interest to Corn Belt feeders is the trend toward large-scale feedlots and feeding operations. There's a tendency toward more specialization and mechanization in cattle feeding. At the extreme are the very large-scale feeding operations in the Southwest where a single operator may feed as many as 40,000 head a year. Is this method likely to "take over" for all cattle feeding?

To throw some light on this question and to help provide guidelines for individual cattle feeders, we studied costs and investment requirements for four different feeding methods – starting with a hand-carried basket and using progressively more capital and less labor in each feeding method. For each method, we used the same basic ration of shelled corn, hay and silage.

JAMES R. GIBBONS, formerly at Iowa State, now is assistant professor of economics, Wisconsin State College, Platteville. EARL O. HEADY is distinguished professor of agricultural economics at Iowa State.

Our research suggests very strongly that the best method for you is the one that best fits your own situation when considered with the points in this article. These points and your situation are the best guide you can use. How can you tell? Let's look at the feeding methods we studied.

The Feeding Methods . . .

The feeding methods we studied used the same basic ration but differed in the degree of mechanization – and, therefore, in the amounts of capital and labor needed.

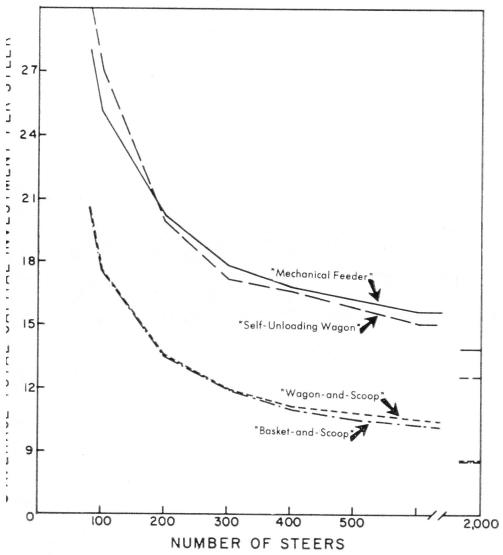
Method I—*Basket-and-Scoop:* You'd commonly use this method with a small operation and have your feeders close to silage and grain storage. A hand-carried basket and scoop would be used. A strong back is an asset. Baled hay would be fed in bunks near storage. Capital needs per steer are lowest for this method, but labor needs per steer are much greater than for the other methods.

As the number of animals increases, operator's fatigue will cause an increase in the labor per steer if one man is doing the feeding. Also, the length of haul will increase with more steers because some of the feed bunks will be farther from the feed storage.

Method II — *Wagon-and-Scoop:* This method has been widely used in the Corn Belt for many years. You'd use a tractor-drawn wagon unloaded with a hand scoop. Baled legume hay is fed in hay bunks near storage. The wagon-and-scoop method requires a tractor and a wagon – equipment that's usually already available on Corn Belt farms. In our study, only the added costs of using the wagon and tractor for this additional job are charged to the steers. These are the only costs that you would incur specifically from using the tractor and wagon to feed the steers.

For more than 300 steers, some wagon and tractor depreciation is charged to steers, because it would be necessary to spend additional money for tractors and wagons. Labor per steer is reduced slightly from Method I and is less strenuous, but capital investment and operating costs are increased some-

CHART I. AVERAGE TOTAL CAPITAL INVESTMENT PER STEER FOR EACH OF THE FOUR METHODS



what when more than 100 steers are fed.

Method III — Self-Unloading Wagon: You'd need a self-unloading wagon, a tractor and an efficient method of loading silage and grain onto the wagon. Most feedlot operators who use self-unloading wagons use fenceline bunks to save moving the wagon through the feedlot. Hence, the cost of fenceline bunks is included in costs for this method. Using a self-unloading wagon lends itself well to a large volume, because wagons can be used for multiple trips. Some western feeders figure that two large wagons are sufficient to feed up to 20,000 cattle.

For only a small volume, your capital investment would be high, and the labor saved might not be great because of the time used in setting up to feed. But the labor you'd have to add for each additional steer fed is very low. Costs for this method include depreciation, repairs, insurance and service on the self-unloading wagon and fenceline bunks in addition to the costs indicated for the wagon-and-scoop method. Hence, the fixed capital investment and operating costs are considerably higher. The fixed costs will "be there" whether you feed 50 or 500 steers.

Method IV—Mechanical Feeder: Here we studied a nearly automatic feeding system which includes an auger feeder. This method is the most efficient in the use of labor. You'd feed hay the same way as for the other methods. But the silage and grain would be mechanically augered into a feeder. Except for hay, this is an almost completely mechanized system. The mechanical feeders consist of a drive unit with feed hopper and a conveying unit.

This method has a very high capital requirement. And capital needs increase as animal numbers increase — and at a faster rate than capital requirements in Method III. Each feeder may be used to feed a top limit of about 200 steers. With over 200 steers, feeders must be duplicated, and cross augers also must be added. Thus, per-unit costs in this system decline up to 200 steers; costs rise again as the system is duplicated and then decline again with more steers.

Your labor requirement for silage and grain handling with the mechanical feeding is at a minimum. But on-farm visits pointed up some very high total costs per steer for this method — especially when used for small numbers of animals. It's a mistake to go to excessive, unnecessary expense in constructing equipment for a mechanical feeding method and then to use it at a small percentage of capacity. Corn silage storage, for example, may not be large enough to furnish enough feed to use the capacity of the equipment, concrete feed bunks, etc., which have been constructed.

Probably as a result of this kind of experience and observations, the mechanical feeding method is considered by many to be a very high cost method. The key is that the equipment must be efficiently designed and constructed for a certain volume and then must be used for that volume to avoid unnecessary expense and fixed costs.

The Costs . . .

Without going into detail here, we computed the costs of feeding different numbers of steers for each of the four feeding methods by using price relationships of the past 10 years. First, we selected the equipment needed for each method of feeding. Then, we found the costs and time elements associated with feeding various numbers of steers for the different methods.

We wanted to know how the costs would change (1) as a result of using the four different methods and (2) as a result of feeding different numbers of cattle. To simplify the analysis, we used the same basic costs per steer or unit of feed under all these conditions. Also, we based the study only on feeder steers kept on the farm about 300 days — with the steers wintered on hay and silage and then full-fed corn, supplement, silage and hay for 150 days. Other feeding programs would affect costs, but our main concern was the *relative* costs of the four methods as the volume of feeder steers changed.

The Costs Considered: To analyze costs for the four feeding methods, we divided costs into (1) capital investment costs per steer, (2) fixed and variable labor costs per steer and (3) fixed and variable nonfeed operating costs per steer.

Fixed labor — opening doors and gates, hooking up equipment, etc. — exists whether you use the equipment for 40 or 540 steers. Variable labor — shoveling and carrying feed, driving the tractor, etc. — is that part of labor that increases in direct proportion to the number of steers fed. Selected fixed costs — depreciation, interest on investment, taxes and insurance — will be with you whether you use certain equipment for 40 or 540 steers. Variable costs — maintenance, repairs, electricity and an hourly charge for a tractor required for the wagon methods — are present only when equipment is used.

Operating costs included all costs studied except labor and interest costs. The interest on the feeder-calf investment is included in the interest cost, however, because capital costs would differ if some operators had more limited funds than others. The cost of both capital and of labor varies, depending upon the source of capital and labor as well as your alternatives for use of capital and management.

Hence, the cost effects of different feeding methods and sizes of enterprise, capital requirements, labor requirements and other selected costs were computed and are graphed separately as: (1) capital investment curves, chart 1; (2)

CHART 2. AVERAGE TOTAL LABOR INPUTS PER STEER IN HOURS FOR EACH OF THE FOUR METHODS

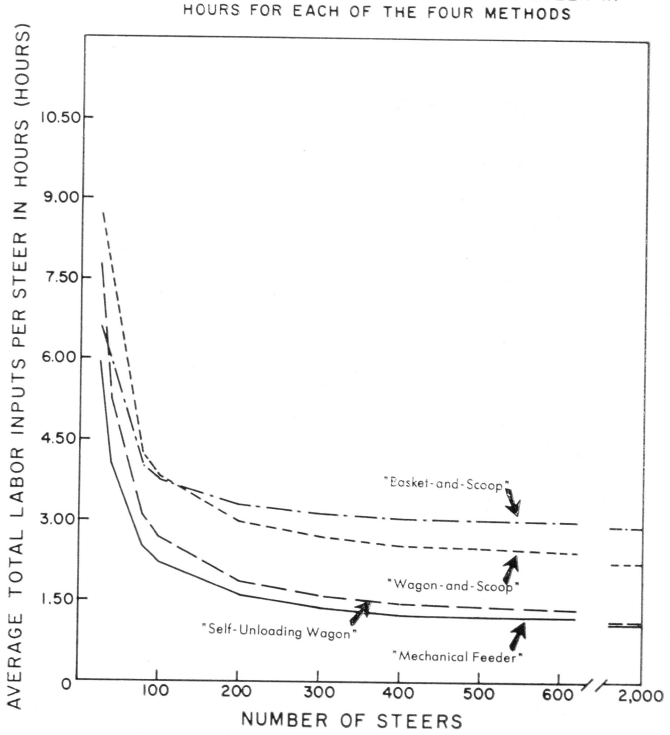
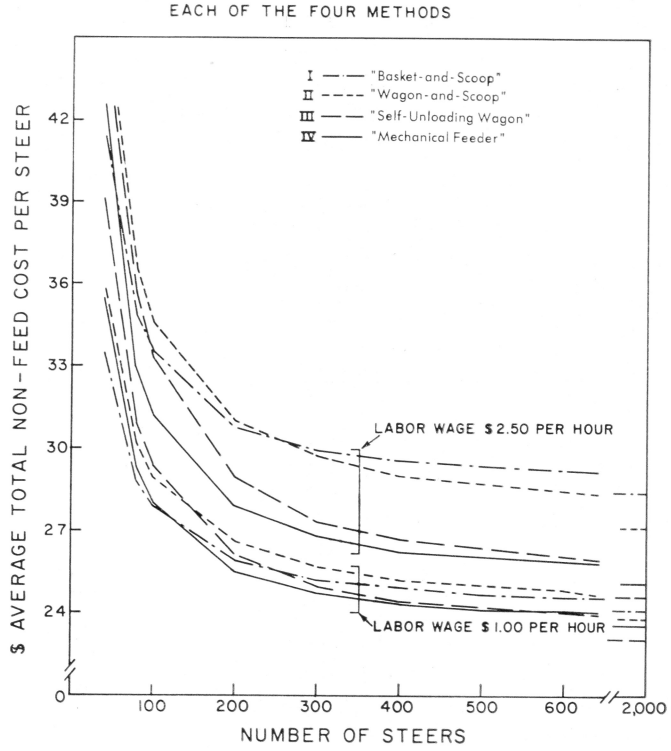


CHART 3. AVERAGE TOTAL NON-FEED COST PER STEER FOR EACH OF THE FOUR METHODS



labor curves, chart 2; and (3) operating cost curves, chart 3.

What We Found . . .

Capital Investment: The capital investment per steer was higher for methods III and IV than for methods I or II at all sizes of feeding operations *(see chart 1)*. The investment for methods I and II is equal to 300 head, since we figured that a tractor and wagon were already available to feed up to 300 head (without preventing use of the wagon for other purposes). However, because of the fixed-cost (investment that is the same regardless of number of cattle fed), investment for all methods drops rapidly up to about a 100-steer volume — and then drops more slowly up to and beyond about 300 steers.

From a 400-steer volume to a 2,000-steer volume, there's a drop of only $2.44 in capital equipment investment per steer for Method I and $2.55 in Method II. Method III takes the largest investment per steer for numbers from 0 to 300. At the 300-steer volume and greater, this method has a lower average investment per steer than Method IV. The investment per steer between the 1,500- and 2,000-steer volume drops by only 45 cents per steer under Method III and by only 40 cents per steer under Method IV.

This means that, for methods III and IV, there's a need to feed 200 or more steers at a time to bring the investment per steer to realistic amounts. Reductions in per-steer investment from 1,000-steer volumes to 2,000-steer volumes are slight in all methods. Using self-unloading equipment or mechanical feeders for fewer than, say, 200 head seems unrealistic from a cost standpoint because of the very high investment necessary.

Labor Requirements: The hours of labor used in feeding different numbers of steers when each of the four feeding methods are used is shown in *chart 2*. There's a fixed amount of labor (again the amount that is the same regardless of the number of steers fed by a given method) that includes such things as opening and closing doors, getting tractors and wagons from storage, "hooking up," etc.

Methods II and III, which make use of a wagon, have the highest fixed labor needs. Methods I and IV have the lowest fixed labor needs but the highest variable labor needs. Method III, with the highest fixed labor needs, however, has the lowest variable needs. This study indicates no special advantages in labor efficiency for the very large units because of size alone. By the time the fixed labor is spread over, say, 100 steers, most of the saving from size has already been attained, and the reduction in labor per steer is not so great from adding another 100 animals.

If very small numbers of cattle are fed with Method II or Method III, you use large amounts of labor per steer. But hours of labor per steer with Method III drop rapidly as the number fed increases. At about 45 steers, Method III uses only as much labor per steer as Method I. At a 50-steer size, the difference in labor requirements between Method I and Method IV is 1.27 hours per steer, a 32-percent difference. At a 2,000-steer volume, however, the difference is 1.82 hours between Method I and Method IV. In other words, Method IV takes 62 percent less labor than Method I. If 1,000 steers are fed, the mechanical feeder method will save nearly the labor of one man for a year. If numbers are increased to 2,000, the labor saving is more than doubled between 1,000 and 2,000 steers.

Labor Costs: We calculated the cost of labor at wage rates of $1 and again at wage rates of $2.50 an hour. The results are shown in the

table. The difference in labor requirements of methods III and IV is very small. At the 2,000-steer volume there's only a small difference in labor requirements for methods III and IV at a wage rate of $1 per hour. In short, if you're to feed more than, say, 200 head, the methods that are large users of capital are small users of labor and vice versa. Hence, the relative costs, and amount of labor and capital you have available are important in determining the lowest cost method for you.

Operating Costs: You have a number of costs, other than investment and labor, which don't include feed or steer costs. We've combined these other costs with investment and labor costs. Included in these costs are such items as depreciation, electric power costs, tractor costs, death losses, transportation costs, medical costs, consumable equipment costs, repair costs, insurance costs, personal taxes, etc.

Chart 3 shows the average total operating or nonfeed costs if you value capital at 7 percent and if labor is charged either at $1 per hour or $2.50 per hour.

Adding It Up . . .

Our analysis suggests that, if your labor is "on hand at no cost" and if you're short on capital for buying steers, methods I or II ordinarily would be most profitable. They would allow you to invest scarce capital in cattle rather than in equipment. You may not want to consider Method IV unless you eventually intend to feed 200 head or more and unless interest rates are low and wages you must pay are high. Method III appears to offer the greatest advantage if you plan to feed 700 to 2,000 head of steers. However, over time, Method IV may be improved more than other methods.

With labor at $1, the costs of the four methods are very close together for 200 steers. But with labor at $2.50 per hour, the differences are relatively large at even 200 steers. (Some farmers have labor with no alternative use in winter. Effectively, this labor then has a zero cost for cattle feeding, and feeding methods might be selected accordingly.) The cost advantage is with methods III and IV. This advantage continues up to 2,000 steers — the upper limit of our study.

Again, if you're short on capital and long on labor you might best use Method I or Method II until you're in position to feed over 200 head and can invest in steer-feeding equipment without taking capital from other uses that give high returns. When investment capital is available and you're feeding more than 200 steers, Method IV, including the mechanical feeder, will be your most efficient method. If you estimate your labor cost at $1 per hour, the self-unloading wagon and fenceline bunks will become your most efficient feeding system at 600 head. If you estimate your labor cost at near $2.50 per hour, Method III will be your lowest cost system when volume reaches 800 steers. But even with labor at $2.50, the difference between Method III and Method IV is very slight between 300 and 2,000 steers.

Remember, however, that we didn't consider changes in costs of feeder steers or feed because of changes in volume handled. Under certain conditions, both feed and steers may cost less when operations are on a very large scale, or there may be a "market tie-in" which gives other advantages to the large operator. When these conditions are considered, the large-scale operations would have even greater advantages over small operations, but such price or cost advantages would be a constant amount per steer regardless of the method of feeding used (if they were all on a large-scale basis).

Average total labor costs per steer over the feeding period for each of the four methods.[a]

	Labor at $1 per hour				Labor at $2.50 per hour			
No. of steers	Method I	Method II	Method III	Method IV	Method I	Method II	Method III	Method IV
15	$9.11	$13.10	$12.20	$9.24	$22.77	$32.75	$30.50	$23.10
25	6.60	8.72	7.79	5.93	16.50	21.80	19.47	14.82
40	5.19	6.35	5.26	4.07	12.97	15.87	13.15	10.18
50	4.72	5.52	4.40	3.45	11.80	13.80	11.00	8.62
70	4.19	4.58	3.44	2.74	10.47	11.45	8.60	6.85
80	4.02	4.25	3.14	2.52	10.05	10.62	7.85	6.30
100	3.78	3.82	2.72	2.21	9.45	9.55	6.80	5.52
125	3.61	3.51	2.40	1.98	9.02	8.77	6.00	4.95
150	3.48	3.24	2.16	1.81	8.70	8.10	5.40	4.52
200	3.32	3.00	1.89	1.60	8.30	7.50	4.72	4.00
300	3.17	2.72	1.61	1.39	7.92	6.81	4.02	3.48
400	3.09	2.55	1.47	1.29	7.73	6.38	3.67	3.22
500	3.07	2.51	1.42	1.23	7.67	6.28	3.55	3.08
600	3.03	2.49	1.36	1.24	7.57	6.22	3.40	3.10
700	3.01	2.45	1.32	1.21	7.52	6.12	3.30	3.02
800	2.99	2.41	1.29	1.19	7.47	6.02	3.22	2.98
1,000	2.96	2.37	1.24	1.15	7.40	5.92	3.10	2.88
1,300	2.93	2.33	1.20	1.12	7.32	5.82	3.00	2.80
1,500	2.92	2.31	1.18	1.11	7.30	5.78	2.95	2.78
2,000	2.91	2.27	1.15	1.09	7.27	5.68	2.87	2.72

[a]Labor costs do not include cost of labor used in removing manure from lots. The value of the manure is assumed to be great enough to cover all costs of manure removal.